

REPAIR INSTRUCTION NO. RI-1078-92/1

1 Aircraft affected

G 115E / EG all as affected

2 Subject

ATA-Code: 53-10 Fuselage Structure
55-40 Rudder

Repair of hinge bracket attachment point – RUDDER and VERTICAL STABILISER

3 Introduction

This Repair Instruction provides the instructions to accomplish the final repair for rudder and vertical stabiliser as defined in MSB1078-205/2 and later revisions.

Revision 1 to introduce minor changes of the repair sequence, adds a cross reference list for fiber materials and introduces the repair procedure in 7.3 for the contact surface of the hinge bracket attachment.

4 Concurrent Documents

| Document No. | Rev. / Date | Title |
|-----------------------|----------------|---|
| 115E AMM, Issue 2 | Rev 8 or later | Grob G 115E Aircraft Maintenance Manual |
| 1T-115E-4, Issue 2 | Rev 0 or later | Grob G 115E Aircraft Illustrated Part Catalogue |
| 1TG115EG-02-00GV-00-1 | 7 or later | Grob G 115EG Aircraft General Vehicle Manual |
| 1TG115EG-3-00-00-1 | 7 or later | Grob G 115EG Structure Repair Manual |
| 1TG115EG-5-08JG-00-1 | 3 or later | Grob G 115EG Aircraft Weight and Balance Manual |
| 1TG115EG-4-00-00-1 | 8 or later | Grob G 115EG Aircraft Illustrated Parts Breakdown |
| MSB1078-205/2 | Rev 2 | Special Inspection Control Surface Hinge Bracket Attachment |

5 Approval Note

The technical content of this document is approved under the authority of the DOA ref. EASA.21J.030.

The associated repair design is approved under the authority of the DOA ref. EASA.21J.030.

6 Limitations

N/A

7 Repair / Instructions

Note: The following instructions describe the repair for a single attachment point. The principal repair procedure is applicable for all attachment points on the rudder and on the vertical stabiliser. For repair of the upper and center attachment point on the vertical stabilizer, refer to 7.2. [The definition and location of the access holes is recommended by Grob only and must not be obeyed.](#)

Note: Each chapter and sub-chapter in the following instruction define the curing process for a specific attachment point. If several locations are repaired at once these curing steps can be combined for the whole repair and must not be followed separately. The repair shall be cured at room temperature for at least 12hrs (GS510020-12) or 6 hrs (GS510020-13) before starting the initial cure. That will prevent the resin from dripping off the repair area. If that is secured, the curing time at room temperature can be adjusted. Make sure to follow the curing cycle i.a.w. AMM Chapter 51-20 for the respective resin system. Nevertheless, the inner and outer repair can be post cured together, if the required temperature at the inner repair can also be reached.

Note: In case of additional findings that are not covered in the following instructions or when in doubt, please contact Grob.

Note: The AMM references in the following instructions are for the G 115E. For G 115EG use the relevant Job Guide

7.1 Repair of Rudder

7.1.1 Make the aircraft safe for parking, refer to AMM Chapter 10-10.

7.1.2 Remove the rudder, refer to AMM Chapter 55-40.

7.1.3 Remove the affected hinge bracket from the rudder, refer to AMM Chapter 51-70. Discard the lock nuts.

7.1.4 For access to the upper and center attachment point, cut an access hole into the left rudder shell as small as practical. [For example refer to Figure 1 and Figure 2.](#)

Note: For S/N 82086 – 82273 the rudder support is installed on top of the center attachment point. It must be removed for the repair to gain access to the bolts. Note the location where the support is installed for later re-installation of a new rudder support (item 8 of List 9).

Note: For S/N 82301 – 82323 the rudder support is not directly installed on top of the center attachment point, it can remain installed for the repair.

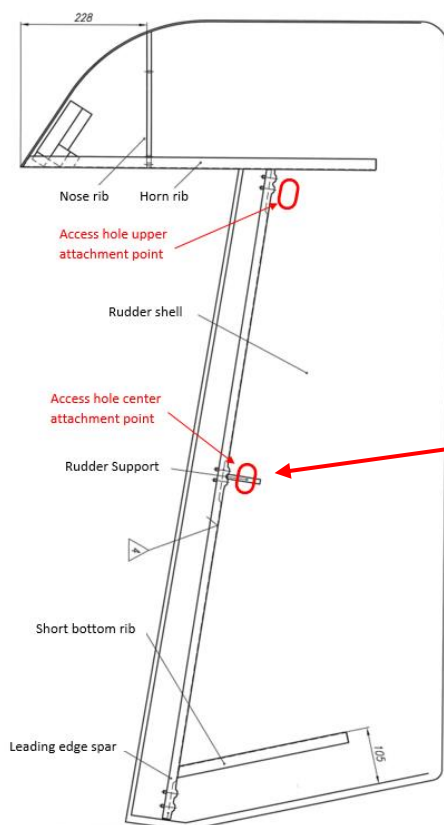


Figure 1: Illustration of rudder and example of access holes

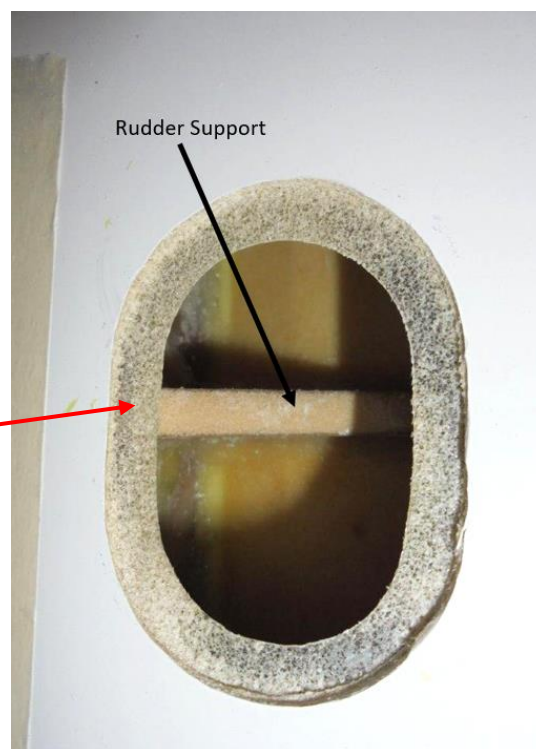


Figure 2: Rudder support installed on top of center attachment point

- 7.1.5 For access to the lower attachment point, cut out the rudder shell i.a.w. Figure 3 and Figure 4. Make sure to open the shell below the radius on both sides.

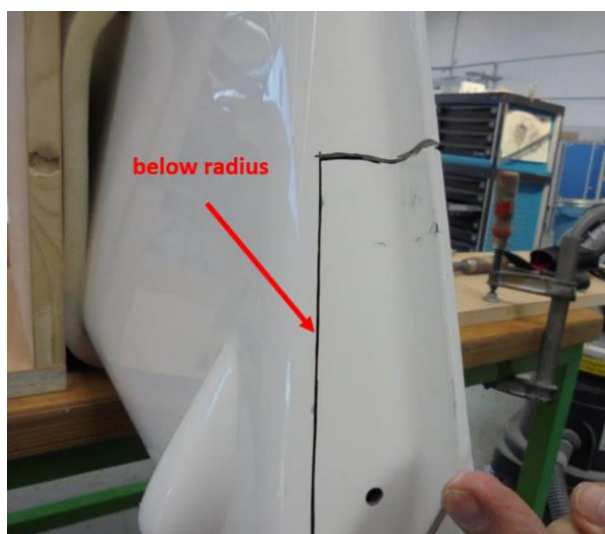


Figure 3: Cutout for lower access



Figure 4: Open rudder shell for lower attachment point repair

- 7.1.6 Remove all hinge bracket bolts and washers at the affected attachment point, refer to AMM Chapter 51-70. Discard the bolts and washers.

- 7.1.7 Carefully grind away the remaining resin and/or two part structural adhesive holding the bolt heads in position.
- 7.1.8 Grind back the resin bead at the corners of the spar/shell attachment to get a "flat fillet weld" for better transition from spar to shell for the repair layers.
- 7.1.9 [Carefully sand the repair area for the overlap repair.](#)
- 7.1.10 If required, remove the damaged glass layer and plywood material around the bolt holes with a piloted counterbore, refer to Figure 5.

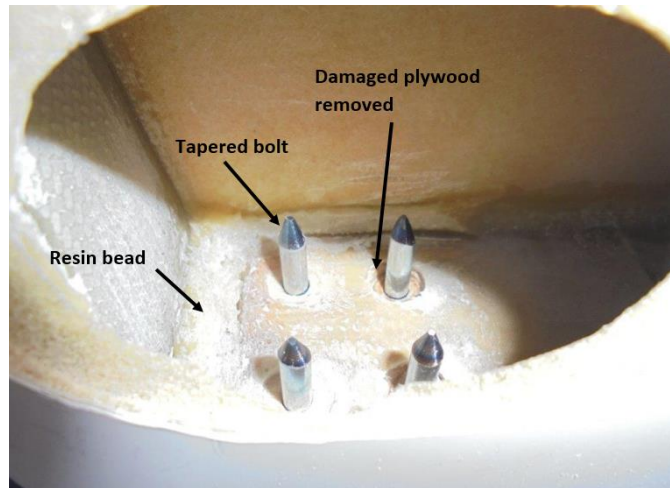


Figure 5: Insert damage removed and tapered bolts installed

- 7.1.11 Remove the grinding dust with a vacuum cleaner.
- 7.1.12 Install four tapered bolts through holes in the spar. The tapered end must point to the inside of the rudder, refer to Figure 5. [Wax the tapered bolts with release agent e.g. QZ5111 before installation.](#) Verify that the repair plate fits in the repair area properly. If required, trim the repair plate [to fit](#).
 - For repair of the upper and center rudder attachment point, install repair plate item 1 of List 9.
 - For repair of the lower rudder attachment point, install repair plate item 2 of List 9.
- 7.1.13 If required, fill-out the holes where the damaged insert material was removed with thickened resin. Use GS510020-13 with 15-20% cotton flocks GS510060 and 2-3% Aerosil GS510063, refer to Figure 6.

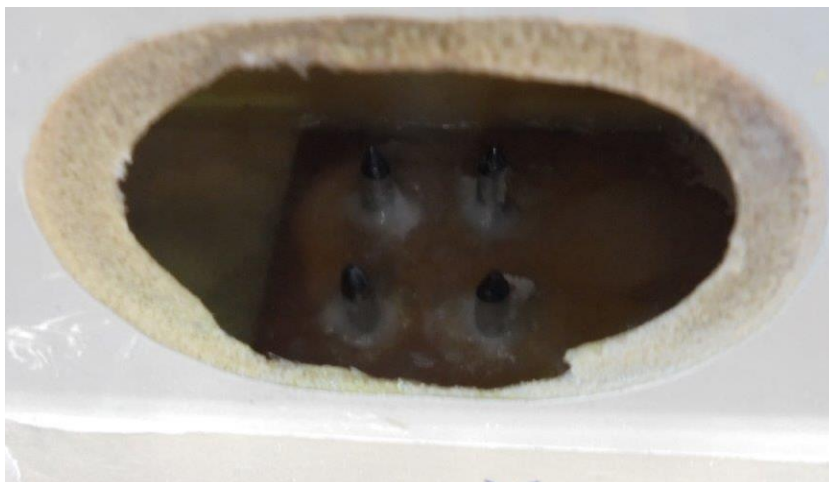


Figure 6: Removed insert material filled with thickened resin

7.1.14 Remove the part number label from the respective repair plate. Make sure to remove any remaining adhesive of the part number label from the repair plate.

7.1.15 Apply thickened resin to the repair plate and to bonding area, refer to Figure 7.

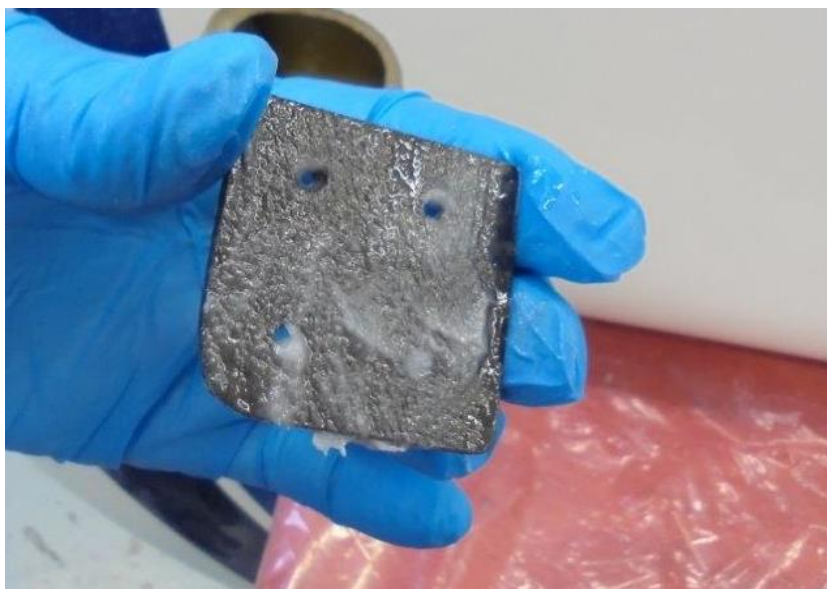


Figure 7: Thickened resin applied to CFRP repair plate

7.1.16 Bond the repair plate with the non-chamfered side through the tapered bolts on top of the insert, refer to Figure 8. Smoothen out the excessive resin at the edges of the repair plate to gain a transition/chamfer to the spar and shell.

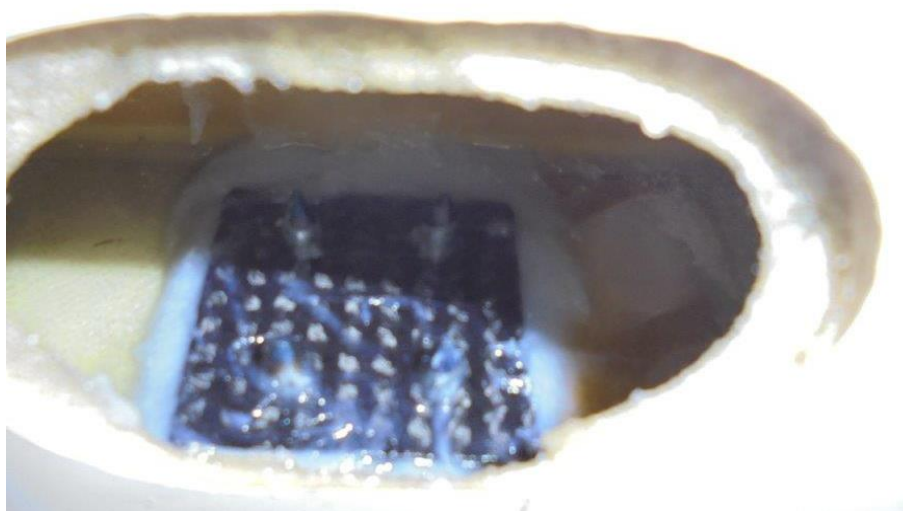


Figure 8: Repair plate bonded on top of the insert with thickened resin

7.1.17 Cover the repair plate with two layers of glass fabric GS510031 $\pm 45^\circ$. Make sure that the overlap to the shell and spar is minimum 25mm.

7.1.18 Remove the tapered bolts.

7.1.19 Install the four washers (item 5 of List 9) and the four bolts (item 6 of List 9), refer to Figure 9. If required, clean the thread of the bolts from resin.



Figure 9: Bolts and washers installed

- 7.1.20 Re-install the removed hinge bracket to the leading edge rib with the previously removed washers and standard M5 nuts. Tighten the nuts by hand just to keep the bolts heads and washers in position. If required, the length of the bolts shall be adjusted by additional washers under the nut, refer to IPC.
- 7.1.21 Apply thickened resin around the bolt heads and washers and cover the repair with two layer of glass fabric GS510031 $\pm 45^\circ$, refer to Figure 10.



Figure 10: Thickened resin around bolt heads and washers with covering layers of glass fabric

- 7.1.22 **If required**, re-install the rudder support angle (item 8 of List 9) at the center attachment point with thickened resin at the previous location. Bond the angle to the RH shell and the repair area.
- 7.1.23 Let the repair cure at room temperature for at least 12hrs (GS510020-12) or 6 hrs (GS510020-13); then perform the 1st stage of the post-curing cycle for 8hrs at 60°C according to AMM Chapter 51-20.
- 7.1.24 If required, close the upper and center access hole **and do the final stage of the post curing-cycle at 80°C, refer to AMM Chapter 51-20.**

7.1.25 If required, close the lower access hole according to the following instructions:

7.1.25.1 Prepare a repair patch with three glass layers GS510030 ($\pm 45^\circ$, $0^\circ/90^\circ$, $\pm 45^\circ$) for the inner repair area with a minimum width of 40mm. Refer to Figure 11 and Figure 12. Let the repair patch cure at room temperature for at least 12hrs (GS510020-12) or 6 hrs (GS510020-13); then perform the 1st stage of the post-curing cycle for 8hrs at 60°C according to AMM Chapter 51-20.

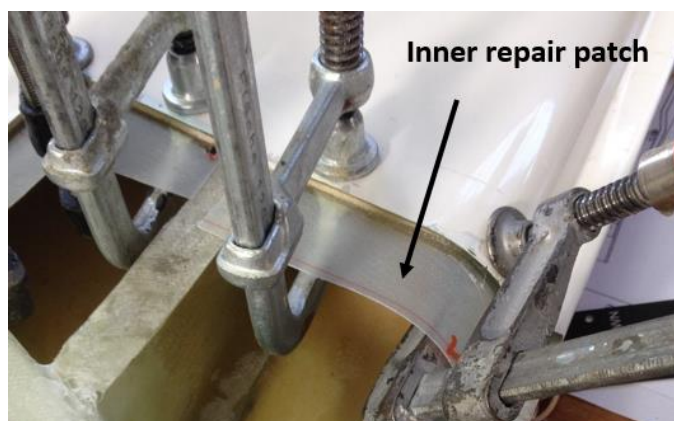


Figure 11: Example of attached inner repair patch

7.1.25.2 Grind the inside and outside repair area of the lower rudder access as well as the inside and outside of the removed cutout. Remove the paint on the outside repair area as required, refer to Figure 12 for dimension.

7.1.25.3 Remove the grinding dust with a vacuum cleaner.

7.1.25.4 Remove the peel ply from the inner repair patch and bond it with thickened resin to the inner rudder shell, refer to Figure 11 and Figure 12. Use screw clamps to fix the inner repair patch in position.

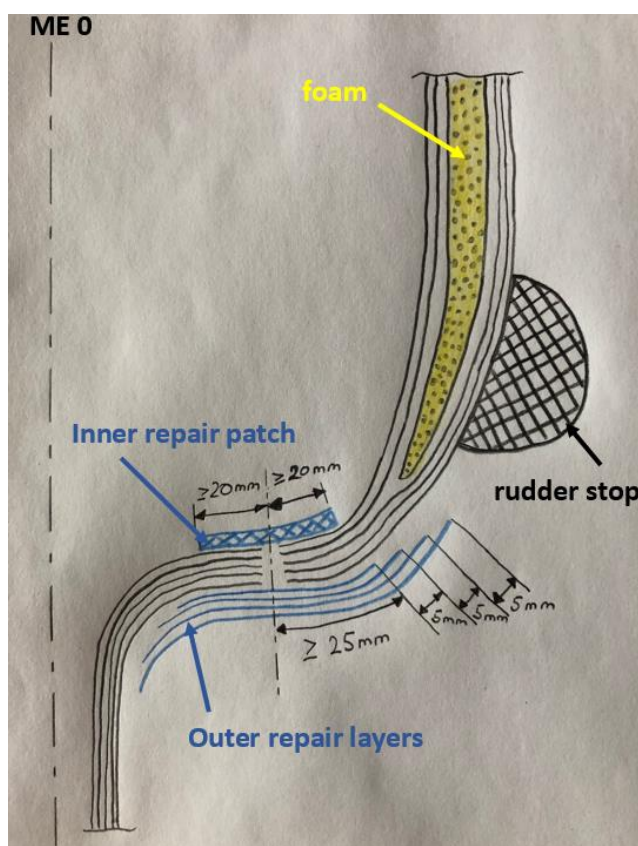


Figure 12: Repair sketch for lower access

- 7.1.25.5 Let the repair cure at room temperature for at least 12hrs (GS510020-12) or 6 hrs (GS510020-13); then perform the 1st stage of the post-curing cycle for 8hrs at 60°C according to AMM Chapter 51-20.
- 7.1.25.6 Remove the screw clamps.
- 7.1.25.7 Apply thickened resin to the other half of the inner repair patch and to the inner side of the removed rudder cutout and re-attach the removed lower part to the rudder.
- 7.1.25.8 Seal the cutted edge with a mixture of resin GS510020 and microballons GS510062; mixing ratio by weight 100:30.
- 7.1.25.9 Do a tapered overlap repair with four layers of glass fabric in the following order:
- 2x GS510031 $\pm 45^\circ$ (1st inner layer minimum length to both sides of the cut 25mm; 2nd layer minimum 30mm to both sides)
 - 1x GS510030 $\pm 45^\circ$ (minimum 35mm to both sides)
 - 1x GS510030 $0^\circ/90^\circ$ (minimum 40mm to both sides)
- For details refer to Figure 12.
- 7.1.25.10 Prepare the repair layers for the outer repair:
- Lay the repair layers on a plastic foil.
 - Wet the layers with resin. Use GS510020.
 - Use a roller to spread the resin and to remove unnecessary resin.
- 7.1.25.11 Apply resin to the repair area. Use GS510020.
- 7.1.25.12 Apply the repair layers to the repair area. Make sure that the fibers point in the correct direction for each layer.
- 7.1.25.13 Cover the repair area with peel ply GS510070.
- 7.1.25.14 Let the repair cure at room temperature for at least 12hrs (GS510020-12) or 6 hrs (GS510020-13); then perform the 1st stage of the post-curing cycle for 8hrs at 60°C according to AMM Chapter 51-20.
- 7.1.25.15 Do the final stage of the post curing cycle at 80°C, refer to AMM Chapter 51-20.
- 7.1.25.16 Remove the peel ply.
- 7.1.25.17 Grind the repair area level.
- 7.1.25.18 Paint the repair area, refer to AMM Chapter 51-20.
- 7.1.26 Replace the standard M5 nuts with self-locking nuts item 7 of List 9. Torque the self-locking nuts of the repaired attachment point with 3.6Nm plus safety torque (friction torque or braking torque).
- 7.1.27 Do a control surface balancing, refer to AMM Chapter 51-60.
- 7.1.28 If required, install the rudder, refer to AMM Chapter 55-40.

7.2 Repair of vertical stabilizer

- 7.2.1 Make the aircraft safe for parking, refer to AMM Chapter 10-10.
- 7.2.2 Remove the rudder, refer to AMM Chapter 55-40.
- 7.2.3 If required, remove the horizontal stabiliser. Refer to AMM Chapter 55-10.
- 7.2.4 Remove the affected hinge bracket from the vertical stabiliser, refer to AMM Chapter 51-70. Discard the lock nuts.
- 7.2.5 Gain access to the inside of the vertical stabiliser at the affected attachment point.

Note: For access to the lower and center attachment point, refer to AMM Chapter 52-40. For access to the upper attachment point, cut out an access hole in the upper rib. Refer to Figure 13 for the dimensions and location of the access hole.

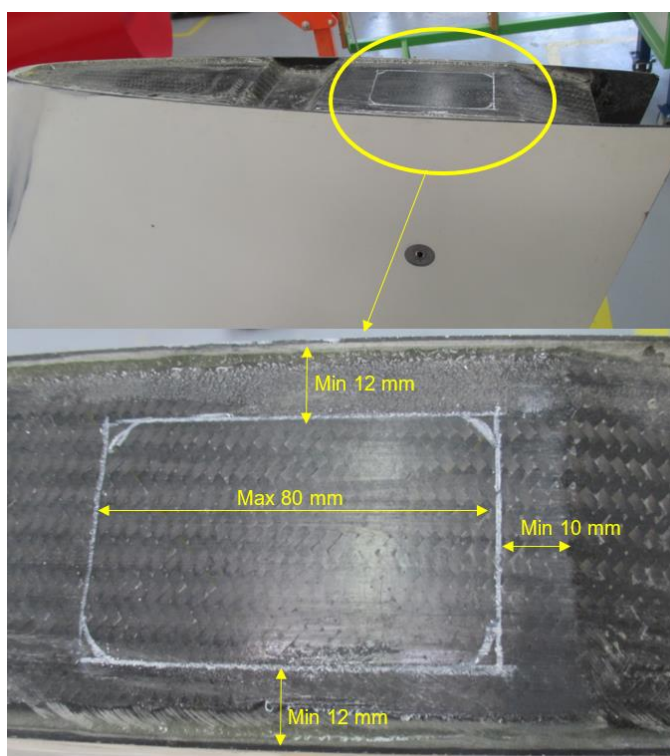


Figure 13: Access hole for upper attachment point

7.2.6 Repair of the upper and center attachment point:

- 7.2.6.1 Remove all hinge bracket bolts and washers at the affected attachment point, refer to AMM Chapter 51-70. Discard the bolts and washers.
- 7.2.6.2 Carefully grind away the remaining resin and/or two part structural adhesive holding the bolt heads in position.

Note: The lightning protection sheet metal remains installed at the upper and center attachment point. Only the currently installed bolts are removed and new bolts and washers are installed. If required, the amount of washers installed under the bolt head can be adjusted for correct length of the bolts installed at the lightning protection sheet metal.

- 7.2.6.3 Grind back the resin bead at the corners of the spar/shell opposite of the lightning protection sheet metal to get a "flat fillet weld" for better transition from spar to shell for the repair layers.
- 7.2.6.4 Carefully sand the repair area for the overlap repair.

- 7.2.6.5 If required, remove the damaged carbon layer and plywood material around the bolt holes with a piloted counterbore.
- 7.2.6.6 Remove the grinding dust with a vacuum cleaner.
- 7.2.6.7 Install two tapered bolts through holes in the spar without the lightning protection. [Wax the tapered bolts with release agent e.g. QZ5111 before installation.](#) The tapered end must point to the inside of the rudder, refer to Figure 5. Verify that the repair plate item 3 of List 9 fits in the repair area. If required, trim the repair plate [to fit](#).
- 7.2.6.8 If required, fill-out the holes where the damaged insert material was removed with thickened resin. Use GS510020-13 with 15-20% cotton flocks GS510060 and 2-3% Aerosil GS510063
- 7.2.6.9 [Remove the part number label from the respective repair plate. Make sure to remove any remaining adhesive of the part number label from the repair plate.](#)
- 7.2.6.10 Apply thickened resin to the repair plate and to bonding area
- 7.2.6.11 Bond the repair plate with the non-chamfered side through the tapered bolts on top of the half insert. Smoothen out the excessive resin at the edges of the repair plate to gain a transition/chamfer to the spar and shell.
- 7.2.6.12 Cover the repair with two layers of carbon fabric GS510040 $\pm 45^\circ$. Make sure that the overlap to the shell and spar is minimum 25mm. Stay clear of the lightning protection sheet metal.
- 7.2.6.13 Remove the tapered bolts.
- 7.2.6.14 Install two washers (item 5 of List 9) and two bolts (item 6 of List 9) on the repair plate side. If required, clean the thread of the bolts from resin.
- 7.2.6.15 Install washers (item 5 of List 9) and two bolts (item 6 of List 9) on the lightning protection sheet metal side. If necessary, adjust the length of the bolts with the number of washers below the bolt head. If required, the length of the bolts can be adjusted by additional washers under the nut, refer to IPC.
- 7.2.6.16 Re-install the removed hinge bracket to rib with the previously removed washers and standard M5 nuts. Tighten the nuts by hand just to keep the bolts heads and washers in position.
- 7.2.6.17 Do a bonding check, refer to AMM 51-80.
- 7.2.6.18 Apply thickened resin around the bolt heads and washers and cover the repair with two layers of glass fabric GS510031 $\pm 45^\circ$.
- 7.2.6.19 Let the repair cure at room temperature for at least 12hrs (GS510020-12) or 6 hrs (GS510020-13); then perform the 1st stage of the post-curing cycle for 8hrs at 60°C according to AMM Chapter 51-20.
- 7.2.6.20 If required, close the upper access hole i.a.w. with the following instructions:
- Make a FRP sheet with four layers of GS510040 $\pm 45^\circ$ with an overlap of minimum 10mm for the access hole. Round out the corners.
 - Prepare the bonding surfaces.
 - Bond the FRP sheet to the rib with thickened resin. Use GS510020-13 with GS510060.
 - Cure the repair at room temperature for at least 6 hours at room temperature; then perform the 1st stage of the post-curing cycle for 8 hrs at 60°C according to AMM Chapter 51-20.
- 7.2.6.21 Do the final stage of the post curing-cycle at 80°C, refer to AMM Chapter 51-20.
- 7.2.6.22 Replace the standard M5 nuts with self-locking nuts item 7 of List 9. Torque the self-locking nuts of the repaired attachment point with 3.6Nm plus safety torque (friction torque or braking torque).
- 7.2.6.23 If required, close the center access panel, refer to AMM 52-40.
- 7.2.6.24 [If required, install the rudder, refer to AMM Chapter 55-40.](#)

7.2.7 Repair of the lower attachment point:

Note: The lightning protection sheet metal at the lower attachment point shall be bent away for the repair carefully.

- 7.2.7.1 Remove all hinge bracket bolts and washers at the lower attachment point, refer to AMM Chapter 51-70. Discard the bolts and washers.
- 7.2.7.2 Carefully grind away the remaining resin and/or two part structural adhesive holding the bolt heads in position.
- 7.2.7.3 Grind back the resin bead at the corners of the spar/shell to get a "flat fillet weld" for better transition from spar to shell for the repair layers.
- 7.2.7.4 [Carefully sand the repair area for the overlap repair.](#)
- 7.2.7.5 If required, remove the damaged carbon layers and plywood material around the bolt holes with a piloted counterbore.
- 7.2.7.6 Remove the grinding dust with a vacuum cleaner.
- 7.2.7.7 Install four tapered bolts through holes in the spar. [Wax the tapered bolts with release agent e.g. QZ5111 before installation.](#) The tapered end must point to the inside of the [stabilizer](#) (minimum length inside 7mm), refer to Figure 5. Verify that the repair plate item 4 of List 9 fits in the repair area properly. If required, trim the repair plate [to fit](#).
- 7.2.7.8 If required, fill-out the holes where the damaged insert material was removed with thickened resin. Use GS510020-13 with 15-20% cotton flocks GS510060 and 2-3% Aerosil GS510063
- 7.2.7.9 Apply thickened resin to the repair plate and to bonding area
- 7.2.7.10 Bond the repair plate with the non-chamfered side through the tapered bolts on top of the half insert. Smoothen out the excessive resin at the edges of the repair plate to gain a transition/chamfer to the spar and shell.
- 7.2.7.11 Cover the repair with two layers of carbon fabric GS510040 $\pm 45^\circ$. Make sure that the overlap to the shell and spar is minimum 25mm.
- 7.2.7.12 Remove the tapered bolts.
- 7.2.7.13 Install four washers (item 5 of List 9) and four bolts (item 6 of List 9) with the previously removed lightning protection sheet metal on the repair plate side. If required, clean the thread of the bolts from resin.
- 7.2.7.14 Re-install the removed hinge bracket to rib with the previously removed washers and standard M5 nuts. Tighten the nuts by hand just to keep the bolts heads and washers in position
- 7.2.7.15 Apply thickened resin around the bolt heads and washers and cover the repair with two layers of glass fabric GS510031 $\pm 45^\circ$.
- 7.2.7.16 Let the repair cure at room temperature for at least 12hrs (GS510020-12) or 6 hrs (GS510020-13); then perform the 1st stage of the post-curing cycle for 8hrs at 60°C according to AMM Chapter 51-20.
- 7.2.7.17 Do the final stage of the post curing-cycle at 80°C, refer to AMM Chapter 51-20.
- 7.2.7.18 Replace the four standard M5 nuts with four self-locking nuts item 7 of List 9. Torque the self-locking nuts of the repaired attachment point with 3.6Nm plus safety torque (friction torque or braking torque).
- 7.2.7.19 Do a bonding check, refer to AMM 51-80.
- 7.2.7.20 [Close the lower access panel, refer to AMM 52-40.](#)
- 7.2.7.21 [If required, install the rudder, refer to AMM Chapter 55-40.](#)

7.3 Repair of contact surface of hinge bracket attachment

Note: The following instructions are only applicable for an uneven surface at the hinge bracket attachment points with a maximum gap of 0.3mm i.a.w. MSB-1078-205/3 or later. If any kind of damage to the laminate is evident or the height of the gap exceeds a maximum of 0.3mm, please contact Grob.

- 7.3.1 If required, make the aircraft safe for parking, refer to AMM Chapter 10-10.
- 7.3.2 If required, remove the rudder, refer to AMM Chapter 55-40.
- 7.3.3 If required, remove the affected hinge bracket from the rudder / vertical stabiliser.
Discard the lock nuts.
- 7.3.4 Carefully sand the repair area
- 7.3.5 Fill up the gap with GS510109. Level the adhesive with a spatula. Let the adhesive cure according to manufacturer's instruction.
- 7.3.6 If required, grind the adhesive level with the spar.
- 7.3.7 Install the removed hinge bracket with the previously removed washers and new self-locking nuts item 7 of List 9.
- 7.3.7.1 If the hinge bracket attachment point has been repaired i.a.w. steps 0 or 7.2, torque the self-locking nuts with 3.6Nm plus safety torque (friction torque or braking torque).
- 7.3.7.2 If the hinge bracket attachment point has **not** been repaired i.a.w. steps 0 or 7.2, torque the self-locking nuts with 1.5Nm plus safety torque (friction torque or braking torque).
- 7.3.8 Install the rudder, refer to AMM Chapter 55-40.

8 Weight and CG

Do a control surface balancing, refer to AMM Chapter 51-60.
Do a weight and balance, refer to AMM Chapter 08-10.

9 Material and Availability

| Item | P/N | Description | Qty. per A/C |
|------|----------------|---------------------------|--------------|
| 1 | 115E-3103.04RI | Upper/Center Repair Plate | 2 |
| 2 | 115E-3103.03RI | Lower Repair Plate | 1 |
| 3 | 115E-2734.04RI | Upper/Center Repair Plate | 2 |
| 4 | 115E-2734.03RI | Lower Repair Plate | 1 |
| 5 | DIN9021-A2-5.3 | Washer | AR |
| 6 | 115E-3103.01RI | Bolt | 24 |
| 7 | LN9348-05 | Self-Locking Nut | 36 |
| 8 | 115E-3107 | Rudder Support | AR |

For further repair material, refer to AMM Chapter 51-30

Table 1: Cross Reference List Fiber Materials

| P/N Grob | P/N (Manufacturer) | Description |
|-----------|---|--|
| GS510030 | 92110 (P-D Interglas Technolgies GmbH); 917 (Porcher Industries) | Glass Fiber Fabric Twill 2/2, 163 g/m ² |
| GS510031 | 92125 (P-D Interglas Technolgies GmbH); 3063 (Porcher Industries) | Glass Fiber Fabric Twill 2/2, 280 g/m ² |
| GS510040* | 98141 (P-D Interglas Technolgies GmbH); 3692 (Porcher Industries) 452 (C. Cramer, Weberei, GmbH & Co. KG) KDK 8042 (SGL CARBON GmbH) | Carbon Fiber Fabric Twill 2/2, 204 g/m ² |
| GS518002 | 459 (C. Cramer, Weberei, GmbH & Co. KG) | Carbon Fiber Fabric + Alu Mesh for Lightning Protection |

*HTA Fiber!

10 Special Tools

Tapered Bolts

11 Appendices

N/A

12 Accomplishment

The instructions in paragraph 7 have to be accomplished and certified in the logbook by authorized staff:

- in EASA countries according to EASA Part 66
- in non-EASA countries according to national regulations with respect to maintenance.

13 Contact

For questions and assistance or in case of occurrence please contact:

| | |
|---------|--|
| | Product Support, |
| phone: | +49 8268 998105 |
| fax: | +49 8268 998200 |
| e-mail: | productsupport@grob-aircraft.com |